CRYSTAL OSCILLATOR (Programmable)
SPREAD SPECTRUM
OUTPUT: CMOS

Product Number
X1G005281xxxx00

SG-9101CGA

- Frequency range : 0.67 MHz ~ 170 MHz (1 ppm Step)
- Supply voltage : 1.62 V ~ 3.63 V
- Function : Output enable (OE) or Standby ($\overline{ST}$)
- Down or Center spread modulation
- Configurable spreading
  3 modulation profile (Hershey-kiss, Sine-wave, Triangle),
  4 modulation frequency, 6 spread percentage
- Package : 2.5 x 2.0 (mm)
- PLL technology to enable short lead time
- AEC-Q100 compliant


Specifications (characteristics)

Item	Symbol	Specifications				Conditions/Remarks	
Supply voltage	V_{CC}	1.80 V Typ.		2.50 V Typ.	3.30 V Typ.		
		1.62 V to 1.98 V	1.98 V to 2.20 V	2.20 V to 2.80 V	2.70 V to 3.63 V		
Output frequency range	f_O	0.67 MHz to 170 MHz					
Storage temperature range	T_stg	-40 ºC to +125 ºC				Storage as single product.	
Operating temperature range	T_use	-40 ºC to +125 ºC					
Frequency tolerance*1	f_tol	±100 × 10^{-6}				Average frequency of 1s gate time.	
Current consumption	I_{CC}	3.5 mA Max.	3.6 mA Max.	3.7 mA Max.	3.8 mA Max.	T_use = +125 ºC	No load, f_O = 20 MHz
		3.4 mA Max.	3.5 mA Max.	3.6 mA Max.	3.7 mA Max.	T_use = +105 ºC	
		2.9 mA Typ.		3.0 mA Typ.	3.2 mA Typ.	T_use = +25 ºC	
		5.8 mA Max.	6.1 mA Max.	7.0 mA Max.	8.4 mA Max.	T_use = +125 ºC	No load, f_O = 170 MHz
		5.7 mA Max.	6.0 mA Max.	6.9 mA Max.	8.3 mA Max.	T_use = +105 ºC	
		4.9 mA Typ.		5.9 mA Typ.	7.0 mA Typ.	T_use = +25 ºC	
Output disable current	I_dis	3.5 mA Max.	3.5 mA Max.	3.6 mA Max.	3.8 mA Max.	T_use = +125 ºC	OE = GND, f_O = 170 MHz
		3.4 mA Max.	3.4 mA Max.	3.5 mA Max.	3.7 mA Max.	T_use = +105 ºC	
Standby current	I_std	2.3 µA Max.	2.5 µA Max.	3.0 µA Max.	4.2 µA Max.	T_use = +125 ºC	$\overline{ST}$ = GND
		0.9 µA Max.	1.0 µA Max.	1.5 µA Max.	2.5 µA Max.	T_use = +105 ºC	
		0.3 µA Typ.	0.4 µA Typ.	0.5 µA Typ.	1.1 µA Typ.	T_use = +25 ºC	
Symmetry	SYM	45 % to 55 %				50 % V_{CC} Level	
Output voltage (DC characteristics)	V_{OH}	90 % V_{CC} Min.				I_{OH}/I_{OL} Conditions [mA]	
	V_{OL}	10 % V_{CC} Max.					
Output load condition	L_CMOS	15 pF Max.					
Input voltage	V_{IH}	70 % V_{CC} Min.				OE or $\overline{ST}$	
	V_{IL}	30 % V_{CC} Max.					
Rise and Fall time Default	tr/tf	3.0 ns Max.				f_O > 40 MHz	20 % - 80 % V_{CC}, L_CMOS = 15 pF
		6.0 ns Max.				f_O ≤ 40 MHz	
Fast		3.0 ns Max.				f_O = 0.67 MHz ~ 170 MHz	
Slow		10.0 ns Max.				f_O = 0.67 MHz ~ 20 MHz	
Disable Time	t_stp	1 µs Max.				Measured from the time OE or $\overline{ST}$ pin crosses 30 % V_{CC}	
Enable Time	t_sta	1 µs Max.				Measured from the time OE pin crosses 70 % V_{CC}	
Resume Time	t_res	3 ms Max.				Measured from the time $\overline{ST}$ pin crosses 70 % V_{CC}	
Start-up time	t_str	3 ms Max.				Measured from the time V_{CC} reaches its rated minimum value, 1.62 V	
Frequency aging	f_aging	This is included in frequency tolerance specification.				+25 °C, first year	

I_{OH}/I_{OL} Conditions [mA]

Rise/Fall time	Vcc	*A	*B	*C	*D
Default (f_O > 40 MHz), Fast	I_{OH}	-2.5	-3.5	-4.0	-5.0
	I_{OL}	2.5	3.5	4.0	5.0
Default (f_O ≤ 40 MHz)	I_{OH}	-1.5	-2.0	-2.5	-3.0
	I_{OL}	1.5	2.0	2.5	3.0
Slow	I_{OH}	-1.0	-1.5	-2.0	-2.5
	I_{OL}	1.0	1.5	2.0	2.5

*A : 1.62 V to 1.98 V, *B : 1.98 V to 2.20 V,
*C : 2.20 V to 2.80 V, *D : 2.70 V to 3.63 V

*1 Frequency tolerance includes initial frequency tolerance, temperature variation, supply voltage variation, reflow drift, load drift and aging (+25 ºC, 1 year).

Pin description

Pin	Name	I/O type	Function		
1	OE	Input	Output enable	High:	Specified frequency output from OUT pin
				Low:	Out pin is low (weak pull down), only output driver is disabled.
	$\overline{ST}$	Input	Standby	High:	Specified frequency output from OUT pin
				Low:	Out pin is low (weak pull down), Device goes to standby mode. Supply current reduces to the least as I_std.
2	GND	Power	Ground		
3	OUT	Output	Clock output		
4	V_{CC}	Power	Power supply		

Product Name

SG-9101CGA 170.000000MHz C 20 P J A A A
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

①Model, ②Package type, ③Frequency,
④Spread type, ⑤Spread percentage code,
⑥Function, ⑦Operating temperature,
⑧Modulation frequency, ⑨Modulation profile, ⑩Rise/Fall time

②Package Type
CG: 2.5 mm x 2.0 mm

④Spread type
C: Center spread
D: Down spread

⑥Function
P: Output enable
S: Standby

⑦Operating temperature
J: -40 °C to +125 °C

⑧Modulation frequency
A: 25.4 kHz (default)
B: 12.7 kHz
C: 8.5 kHz
D: 6.3 kHz

⑨Modulation profile
A: Hershey-kiss (default)
B: Sine-wave
C: Triangle

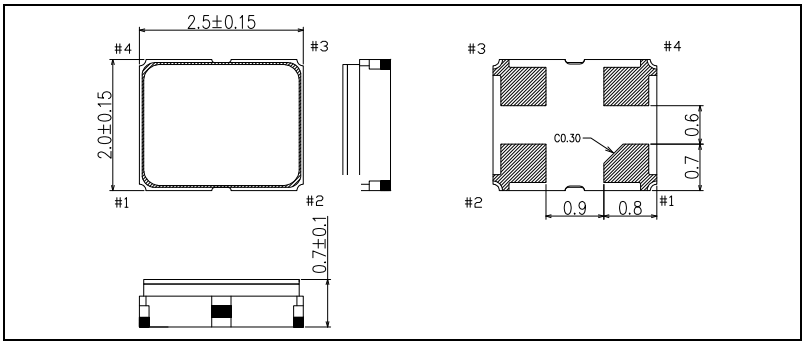
⑩Rise/Fall time
A: Default
B: Fast
C: Slow

Spread spectrum configuration

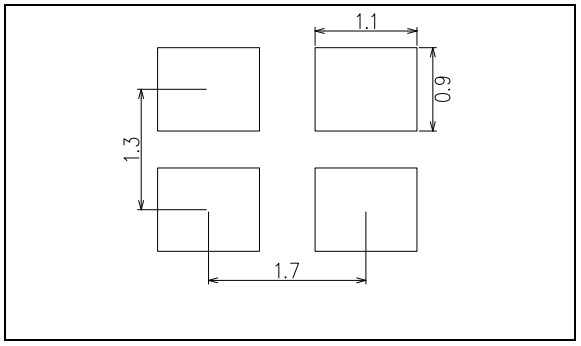
④	C: Center spread modulation	⑤Code	02	05	07	10	15	20
		Spread percentage	±0.25 %	±0.5 %	±0.75 %	±1.0 %	±1.5 %	±2.0 %
	D: Down spread modulation	⑤Code	05	10	15	20	30	40
		Spread percentage	-0.5 %	-1.0 %	-1.5 %	-2.0 %	-3.0 %	-4.0 %

Modulation frequency: 25.4 kHz (default), 6.3 kHz, 8.5 kHz, 12.7 kHz
Modulation profile: Hershey-kiss (default), Sine-wave, Triangle

External dimensions (Unit: mm)



Footprint (Recommended) (Unit: mm)



■Notes:
In order to achieve optimum jitter performance, the 0.1 µF capacitor between V_{CC} and GND should be placed. It is also recommended that the capacitors are placed on the device side of the PCB, as close to the device as possible and connected together with short wiring pattern.

PROMOTION OF ENVIRONMENTAL MANAGEMENT SYSTEM CONFORMING TO INTERNATIONAL STANDARDS

At Seiko Epson, all environmental initiatives operate under the Plan-Do-Check-Action (PDCA) cycle designed to achieve continuous improvements. The environmental management system (EMS) operates under the ISO 14001 environmental management standard.

All of our major manufacturing and non-manufacturing sites, in Japan and overseas, completed the acquisition of ISO 14001 certification.

ISO 14000 is an international standard for environmental management that was established by the International Standards Organization in 1996 against the background of growing concern regarding global warming, destruction of the ozone layer, and global deforestation.

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In order provide high quality and reliable products and services than meet customer needs, Seiko Epson made early efforts towards obtaining ISO9000 series certification and has acquired ISO9001 for all business establishments in Japan and abroad. We have also acquired IATF 16949 certification that is requested strongly by major automotive manufacturers as standard.

IATF 16949 is the international standard that added the sector-specific supplemental requirements for automotive industry based on ISO9001.

►Explanation of the mark that are using it for the catalog

	►Pb free.
	►Complies with EU RoHS directive. *About the products without the Pb-free mark. Contains Pb in products exempted by EU RoHS directive. (Contains Pb in sealing glass, high melting temperature type solder or other.)
	►Designed for automotive applications such as Car Multimedia, Body Electronics, Remote Keyless Entry etc.
	►Designed for automotive applications related to driving safety (Engine Control Unit, Air Bag, ESC etc).